

Northern Michigan University

NMU Commons

Journal Articles

FacWorks

2004

"Two New Species of Platythelphusa A. Milne-Edwards, 1887 and Comments on the Taxonomic Position of P. denticulata Capart, 1952 From Lake Tanganyika"

Saskia AE Marijnissen

Frederick R. Schram

Neil Cumberlidge

Northern Michigan University

Ellinor Michel

Follow this and additional works at: https://commons.nmu.edu/facwork_journalarticles



Part of the [Biology Commons](#)

Recommended Citation

Marijnissen, S., Schram, F., Cumberlidge, N. & Michel, E. 2004. Two new species of *Platythelphusa* A. Milne-Edwards, 1887 (Decapoda, Potamoidea, Platythelphusidae) and comments on the taxonomic position of *P. denticulata* Capart, 1952 from Lake Tanganyika, East Africa, *Crustaceana*, 77 (5), 513-532.

This Journal Article is brought to you for free and open access by the FacWorks at NMU Commons. It has been accepted for inclusion in Journal Articles by an authorized administrator of NMU Commons. For more information, please contact kmcdonou@nmu.edu, bsarjean@nmu.edu.

TWO NEW SPECIES OF *PLATYTHELPHUSA* A. MILNE-EDWARDS, 1887
(DECAPODA, POTAMOIDEA, PLATYTHELPHUSIDAE) AND COMMENTS
ON THE TAXONOMIC POSITION OF *P. DENTICULATA* CAPART, 1952
FROM LAKE TANGANYIKA, EAST AFRICA

BY

SASKIA A. E. MARIJNISSEN^{1,4}), FREDERICK R. SCHRAM¹),
NEIL CUMBERLIDGE²) and ELLINOR MICHEL³)

¹) Institute for Biodiversity and Ecosystem Dynamics, University of Amsterdam, P.O. Box 94766,
NL-1090 GT Amsterdam, Netherlands

²) Department of Biology, Northern Michigan University, Marquette, Michigan 49855, U.S.A.

³) The Natural History Museum, Cromwell Road, London SW7 5BD, U.K.

ABSTRACT

Two new species of *Platythelphusa* (Decapoda, Potamoidea, Platythelphusidae), are described from Lake Tanganyika. *P. immaculata* sp. nov. and *P. praelongata* sp. nov. are distinguished from congeners by a combination of diagnostic characters of the carapace, chelipeds, and pereopods. *Platythelphusa denticulata* Capart, 1952, is removed from synonymy with *P. conculcata*. This brings the number of platythelphusid species reported from Lake Tanganyika to nine. A key is provided to separate the species of *Platythelphusa*.

RÉSUMÉ

Deux espèces nouvelles de *Platythelphusa* (Decapoda, Potamoidea, Platythelphusidae), sont décrites du lac Tanganyika. *P. immaculata* sp. nov. et *P. praelongata* sp. nov. se distinguent de leurs congénères par une combinaison de caractères diagnostiques concernant la carapace, les chélicèdes et les péreïopodes. *Platythelphusa denticulata* Capart, 1952 est retiré de la synonymie avec *P. conculcata*. Ceci porte le nombre des espèces de Platythelphusidae connues du lac Tanganyika à neuf. Une clé est fournie pour séparer les espèces de *Platythelphusa*.

INTRODUCTION

The present work arises out of a long-term study of Lake Tanganyika, East Africa, aimed at evaluating the ecological and phylogenetic relationships of the

⁴) e-mail: s.a.e.marijnissen@uva.nl

freshwater crabs in the lake. Systematic surveys of the benthic communities near Kigoma, Tanzania, and sampling elsewhere in the lake, have resulted in the collection of large numbers of freshwater crab specimens from several different localities in Lake Tanganyika. Taxonomic examination of this collection has revealed the existence of two new species, and has also allowed the reappraisal of the taxonomic status of a third species, that is revived in the present work. The freshwater crabs found in Lake Tanganyika are dominated by species belonging to the *Platythelphusidae* Colosi, 1920, a family that is endemic to Lake Tanganyika. The *Platythelphusidae* appear to be monophyletic (Cumberlidge & Von Sternberg, 1998; Von Sternberg & Cumberlidge, 1999) and are morphologically highly divergent from other potamonautid and deckeniid freshwater crab taxa found in adjacent rivers and lakes in the African Rift System (Moore, 1903; Cunnington, 1907, 1920; Rathbun, 1933; Balss, 1936; Capart, 1952, 1954; Bott, 1955; Cumberlidge et al., 1999). A revision of the genus *Platythelphusa* by Cumberlidge et al. (1999) recognized six species: *P. armata* A. Milne-Edwards, 1887, *P. maculata* Cunnington, 1899, *P. conculcata* Cunnington, 1907, *P. echinata* Capart, 1952, *P. polita* Capart, 1952, and *P. tuberculata* Capart, 1952. The two new species of *Platythelphusa* described here are distinctly different from known species in this genus with regard to a combination of characters from the carapace, chelipeds, and pereopods. The taxonomic position of *P. denticulata* Capart, 1952 is reappraised in the light of new material. This taxon was previously considered to be a junior synonym of *P. conculcata* (cf. Cumberlidge et al., 1999), but *P. denticulata* is treated here as a valid taxon, following comparisons of the relevant type specimens. The addition of *P. immaculata*, *P. praelongata*, and *P. denticulata* brings the total number of species of *Platythelphusa* in Lake Tanganyika to nine.

We present a table of characters that distinguish the new species from their congeners and an updated key to the platythelphusid species. The type material of *P. immaculata* and *P. praelongata* has been deposited in the Zoologisch Museum Amsterdam (ZMA).

Terminology is adapted from Cumberlidge (1999) and Cumberlidge et al. (1999). Abbreviations used in the text are: CW = carapace width, CH = carapace height, CL = carapace length, FW = width of the frontal margin, P2-P5 = second to fifth pereopods, a3-a6 = third to sixth pleonal segments, a7 = telson, s1-s8 = first to eighth thoracic sternites, e4-e7 = fourth to seventh episternites, Go1 = male first gonopod, Go2 = male second gonopod. All measurements are given in mm. IRSN = Institut Royal des Sciences Naturelles, Brussels, Belgium.

TAXONOMY

Family PLATYTHELPHUSIDAE Colosi, 1920

Platythelphusa A. Milne-Edwards, 1887***Platythelphusa immaculata* n. sp. (fig. 1A-D)**

Material examined. — Holotype, 1 male, CW 18.22 mm (ZMA De.204594), Lake Tanganyika, Cape Mpimbwe near Katondo Point, Tanzania (7°05.59'S 30°30.00'E), 7 m depth, sand and rocks, coll. G. Kazumbe, 9 February 2003. Paratypes, 1 female, adult, CW 25.70 mm (ZMA De.204599), Mzungu Point (4°55.05'S 29°35.73'E), 10 m depth, cobbles and sand, coll. S. Marijnissen, 23 September 2002; 2 females, adult, CW 25.38, 22.31 mm, 1 female, subadult, CW 17.81 (ZMA De.204600), Mzungu Point, 14 m depth, cobbles, 6 March 2001; 1 female, adult, CW 27.06 mm (ZMA De.204596), Mwamahunga (4°54.730'S 29°35.901'E), 12 m depth, trap, coll. P. B. McIntyre, 13 July 2001; 1 female, adult, CW 31.02 mm (ZMA De.204597), Mwamahunga, 3 m depth, cobbles, coll. S. Marijnissen, 29 July 2002; 1 female, subadult, CW 21.15 mm (ZMA De.204598), Mwamahunga, 11 m depth, rocks and sand, 25 March 2002; 1 male, CW 17.01 mm; 1 male, juvenile, CW 12.15 mm; 14 females, adult CW 16.09, 20.27, 20.52, 21.63, 21.73, 21.80, 21.19, 23.04, 24.26, 25.31, 25.34, 25.37, 25.47, 28.67 mm; 1 female, juvenile, CW 13.17 mm (ZMA De.204601), Kigoma, Tanzania (4°54.73'S 29°35.90'E), 2-20 m depth, rocks and cobbles, coll. S. Marijnissen and G. Kazumbe, June-October 2002, 1 female, adult, CW 22.36 mm, 1 male, CW 18.00 mm (ZMA De.204.638), Mbita Island south side, Mpulungu, Zambia (8°45.23'S 31°05.14'E), 7 m depth, rocks and sand, coll. S. Marijnissen, 17 July 2003.

Diagnosis. — Carapace subhexagonal, rounded, wider than long (CW/FW 2.70 ± 0.15 ; CL/FW 2.19 ± 0.28), very flat (CH/FW 0.86 ± 0.06). Frontal margin granulate, exterior angles produced into sharp, pointed teeth. Exorbital angle produced into broad forward-directed tooth. Anterolateral margin between exorbital and epibranchial teeth granulate. Epibranchial tooth broad, pointed; anterolateral margin behind epibranchial tooth with two large teeth (fig. 1A). Suborbital margin lined with small tooth-like tubercles; medial end of margin with narrow, pointed tooth (fig. 1C). Lateral, superior, and inferior margins of merus of cheliped granulate. Inner margin of carpus of cheliped with two large subequal teeth, articular tooth (at point of articulation with propodus) broad, pointed; outer margin of carpus either granulate or with several small teeth. Cheliped propodal palm concave, fingers of propodus and dactylus with spatula-like tips (fig. 1B). Marked sexual dimorphism in cheliped shape; adult male with enlarged major chela, propodus and dactylus with molar dentition; propodus and dactylus of minor chela with serrated dentition; adult female with almost equally sized, slim chelipeds, fingers of both chelipeds with serrated dentition. Merus of P5 almost as long as FW. Subdistal tooth on superior margin of meri of P2-P4 small and spine-like; distal tooth either spine-like or small and low. Inferior margins of propodi of P2-P4 smooth. Superior margin of dactyli of P3-P4 with row of minute spines and several larger distal spines; inferior margins smooth, with several distal spines.

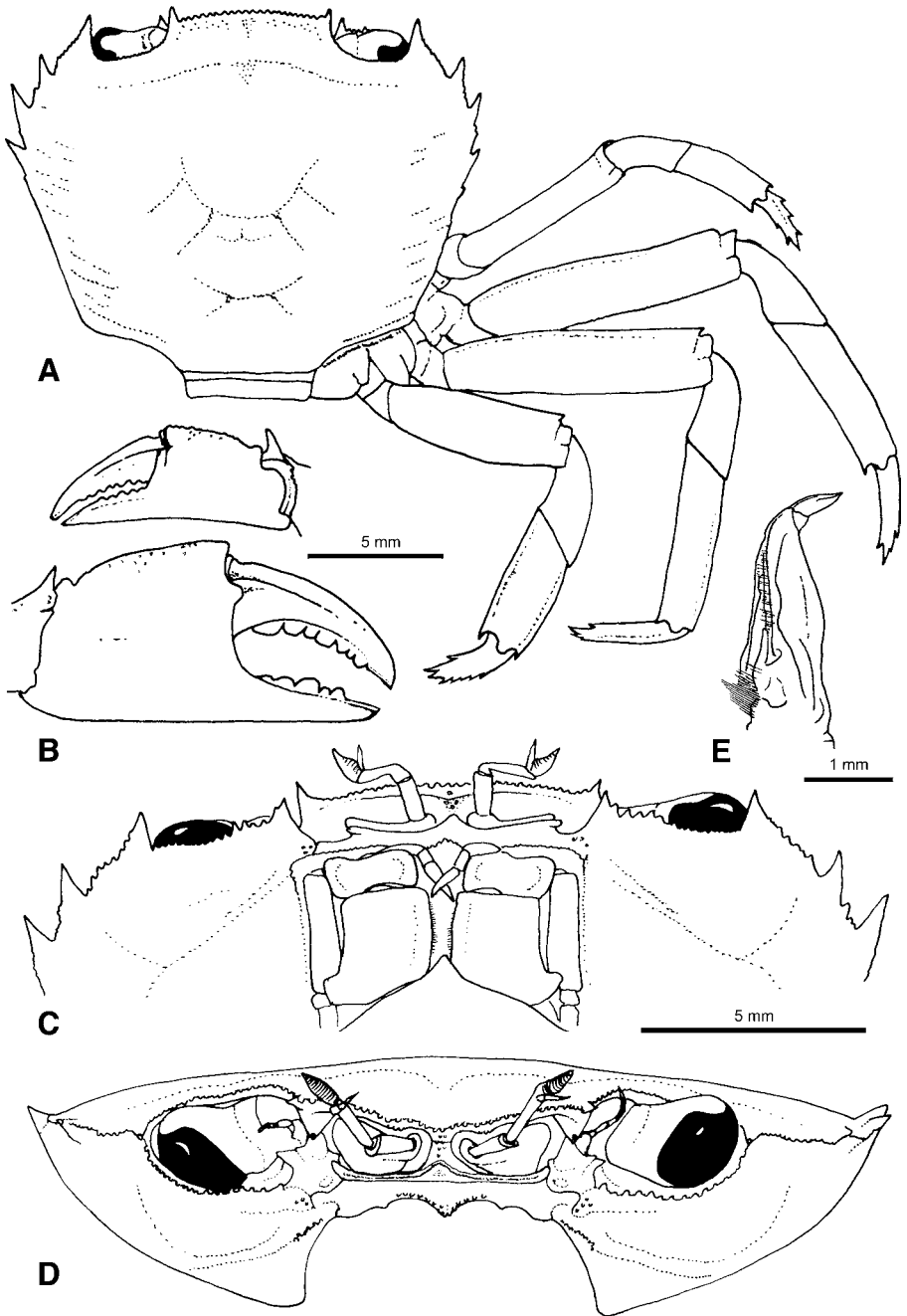


Fig. 1. *Platythelphusa immaculata* n. sp., male, CW 18.22 mm, holotype (ZMA De.204594). A, dorsal view of carapace and pereopods 2-5; B, frontal view of left (above) and right (below) cheliped; C, ventral view of anterior area of carapace showing suborbital margin and 3rd maxillipeds; D, frontal view of carapace; E, ventral view of right gonopod 1.

Terminal article of Go1 directed outward at a 60° angle to the vertical; slim cone-shaped article tapering strongly to pointed tip (fig. 1E).

Description. — Fields of short carinae in lateral regions of carapace; anterolateral margin of carapace continuous with posterolateral margin. Cardiac region and cervical grooves well defined (fig. 1A). Triangular descending process of front produced into a small tooth. Occlusal (sub-ocular) tooth in orbital hiatus well developed (fig. 1D). Suborbital margin with a prominent shelf, lined with irregularly shaped, tooth-like tubercles (fig. 1C). First antennal segment oval and fused into epistome; second antennal segment large and rectangular, with large transverse process, lying in orbital hiatus between descending frontal tooth and occlusal tooth; distal antennal segment slim and elongated, supporting short antennal flagellum.

Distinct granular endostomial ridges marking medial sides of left and right anterior respiratory channels; epistomial triangle conspicuous, granular, pointing horizontally. Mandibular palp with three segments; proximal two segments of palp incompletely fused so that sulcus between segments is still visible under magnification; terminal segment a single large oval process positioned behind mandible. Third maxillipeds filling entire buccal frame, except for transversely oval anterior respiratory openings at superior lateral ends; merus with flanged edges and conspicuously widened upper lateral margins; ischium same width as merus, suture between ischium and basis marked by distinct line. Inferior lateral corner of ischium of third maxilliped produced into distinct short proximal process overlapping base of exopod of third maxilliped; exopod of third maxilliped long ($0.66 \times$ merus length), robust ($0.33 \times$ ischium width); distinct distal medial process of exopod, exopod with long flagellum.

Epimeral sulcus present on sidewall of carapace, vertical sulcus between epimeral sulcus and base of epibranchial tooth visible, but not sharply distinct. Anterior margin of front almost horizontal, indented slightly in middle. Postfrontal crest distinct, incomplete, lined by granules and not meeting anterolateral margins; short mid-groove on postfrontal crest.

Male pleon slim, triangular outline formed by pleonal segments a3-a6; telson (a7) triangular; a1-a6 four sided; a3 broadest segment; sides of a4-a7 angled inward. Outline of female pleon broad and shield shaped, telson forming broad triangle.

Thoracic sternal suture s1/s2 short, complete, distinct; sternal suture s2/s3 complete, crossing entire sternum, indistinct; sternal suture s3/s4 incomplete, reduced to two small notches at sides of sternum. Episternal sutures e4/s4, e5/s5, e6/s6, and e7/s7 complete, distinct. Sternal sulci (s4/s5, s5/s6) in sterno-pleonal cavity widely separated medially, sternal sulci s6/s7, s7/s8 almost continuous but not interrupted in the midline by vertical sulcus (medial line); vertical sulcus broad, interrupted in middle by diamond-shaped space. Pair of small rounded sternal

condyles (“typical press-buttons”, Guinot & Bouchard, 1998) within sterno-pleonal cavity on s5. Female sexual openings in sterno-pleonal cavity on s6.

Subterminal segment of Go1 longer than terminal article of Go1; subterminal segment reaching as far as s5. Subterminal segment of Go1 rectangular, broadest at base and in mid section; ventral side not completely enclosed: medial side exposed, lateral side covered by long lateral flap folded inwards across segment from lateral margin; lateral flap continuous with longitudinal groove of terminal article, reaching from basis of terminal article to gonopod chamber of subterminal segment. Margins of subterminal segment and lateral flap lined with setae. Terminal article of Go1 relatively short, about 1/5 length of subterminal segment. Ventral side of terminal article of Go1 with two lengthways folds (lateral and medial folds) separated by a distinct longitudinal groove. Dorsal side of terminal article of Go1 smooth; distinct dorsal membrane at junction between subterminal segment and terminal article. Go2 slightly longer than Go1. Subterminal segment of Go2 same length as subterminal segment of Go1. Subterminal segment of Go2 widest at base, tapering sharply inward to form long, thin, rod-like process; rounded collar at junction between terminal article and subterminal segment. Terminal article of Go2 flagellum-like, measuring about half as long as subterminal segment of Go2.

Etymology. — The specific name *immaculata* is taken from the Latin adjective ‘immaculatus’, meaning unstained or spotless. The adjective thus agrees in gender with the (feminine) generic name.

Colour. — In life, carapace uniform grey-pink to orange-brown, lacking stains or spots; tips of chelipeds and pereopods white.

Distribution. — The species is known currently only from the vicinity of Kigoma, Tanzania and from Mpulungu, Zambia.

Habitat. — Specimens were collected from underneath rocks and cobbles at depths ranging from 2 to 20 meters. *Platythelphusa immaculata* is sympatric with *P. conculcata*, *P. echinata* and juveniles of *P. armata*.

Remarks. — The distal tooth on the superior margin of the merus of P2-P4 varies in size from a small spine in the holotype, to either a low tooth, or being absent altogether on some legs in other specimens (ZMA De.204601). In some specimens (ZMA De.204601), the two teeth on the anterolateral margin behind the epibranchial tooth are interspersed with minute, irregularly shaped teeth.

The general outline of the carapace and the characters of the pereopods of *P. immaculata* most closely resemble those of *P. conculcata* and *P. echinata*. *Platythelphusa immaculata* is distinguished from *P. conculcata* by differences in the relative height and width of the carapace; in the frontal margin, which is fringed with pronounced tooth-like tubercles in *P. conculcata*, but granular in *P. immaculata*; and in the superior margin of the cheliped merus, which is granular in *P. immaculata* but with a small distal tooth in *P. conculcata* (tables I

TABLE I
Morphological comparison of the nine species of *Platythelphusa* recognized herein

	<i>P. armata</i> A. Milne-Edwards, 1887	<i>P. denticulata</i> Capart, 1952	<i>P. maculata</i> Cunnington, 1899	<i>P. praelongata</i> n. sp.	<i>P. tuberculata</i> Capart, 1952
Frontal margin	almost horizontal, indented	almost horizontal, indented	slightly deflexed, slightly indented	slightly deflexed, slightly indented	slightly deflexed, slightly indented
Frontal margin	granular	tuberculated	finely granular	granular	finely granular
Front, external angles	square, with sharp teeth	square, with sharp teeth	square, lacking teeth or with minute teeth	rounded, without teeth	square, with small teeth
Anterolateral margin between exorbital and epibranchial teeth	granular	granular, or lined with small teeth	granular	finely granular	finely granular
Epibranchial tooth	variable size, from medium to large	variable size, from medium to large	variable size, from small to medium	minute	always smaller than anterolateral teeth
Anterolateral margin	variable number of unequal sized teeth	variable number of unequal sized teeth	2 or 3 teeth of variable size, from small to medium	several minute teeth and 1 broad tooth lateral of mesogastric region	2 or 3 teeth, tooth lateral of mesogastric region is always the largest
Suborbital margin	small regular shaped, tooth-like tubercles	irregular tooth-like tubercles	minute regular shaped, tooth-like tubercles	small regular shaped, tooth-like tubercles	minute regular shaped, tooth-like tubercles
Suborb. margin, medial end	large, pointed tooth	narrow, pointed tooth	broad, low tooth	broad, low tooth	broad, pointed tooth
3 rd Maxillipeds medial margins	gape absent	gape absent	gape absent	gape absent	slight gape
Epibranchial lobes	slightly raised	slightly raised	slightly raised	not raised	pronouncedly raised

TABLE I
(Continued)

	<i>P. immaculata</i> n. sp.	<i>P. conculcata</i> Cunnington, 1907	<i>P. echinata</i> Capart, 1952	<i>P. polita</i> Capart, 1952
Frontal margin	almost horizontal, indented	almost horizontal, indented	slightly deflexed, slightly indented	deflexed, slightly indented
Frontal margin	granular	tuberculated	finely granular	minutely granular
Front, external angles	square, with sharp tooth	square, with sharp tooth	square, with small low tooth, sometimes lacking tooth	square, without tooth
Anterolateral margin between exorbital and epibranchial teeth	granular	granular	granular	granular
Epibranchial tooth	almost equal size as anterolateral teeth	almost equal size as anterolateral teeth	sometimes lacking, otherwise almost equal size as anterolateral teeth	almost equal size as anterolateral tooth
Anterolateral margin	2 almost equal sized teeth	2 equal sized teeth	1 or 2 teeth	1 tooth
Suborbital margin	irregular shaped tooth- like tubercles	irregular shaped tooth- like tubercles	minute regular shaped, tooth-like tubercles	minute regular shaped, tooth-like tubercles
Suborb. margin, medial end	narrow, pointed tooth	narrow, pointed tooth, sometimes several fused teeth	no tooth	no tooth or small, low tooth
3 rd Maxillipeds medial margins	gape absent	gape absent	gape absent	gape absent
Epibranchial lobes	not raised	not raised	not raised	not raised

TABLE I
(Continued)

	<i>P. armata</i>	<i>P. denticulata</i>	<i>P. maculata</i>	<i>P. praelongata</i>	<i>P. tuberculata</i>
Intersexual dimorphism between chelipeds	absent	absent	present	no data	present
Cheliped dactylus, dorsal margin	granular	serrated	granular	finely granular	finely granular
Cheliped carpus, articular tooth	broad, pointed	broad, pointed	low and blunt, or small tooth	broad, pointed	low and blunt, or small tooth
Cheliped carpus, dorsal margin	granular	several unequal teeth	granular	granular	granular, or several small teeth
Cheliped merus, medial inferior margin	granular, large distal tooth	granular, large distal tooth	granular, large distal tooth	granular, large distal tooth	granular, large distal tooth
Cheliped merus, superior margin	finely granular	granular, sometimes with small distal tooth	finely granular	finely granular	granular, distal tooth, sometimes several unequal teeth posterior to distal tooth
Ischium P1-P5, inferior margin	smooth	granular	granular	finely granular	distal spine
Merus P2-P4, subdistal tooth	no spine	pointed spine	no spine	no spine	no spine
Merus P2-P4, distal tooth	no spine	no spine, or small spine	no spine	no spine	small spine
Merus P2-P4, inferior margin	minutely serrated	minutely serrated	minutely serrated	granular	minutely serrated
Propodus P2, inferior margin	several minute spines	several minute spines	several minute spines	several minute spines	several minute spines

TABLE I
(Continued)

	<i>P. armata</i>	<i>P. denticulata</i>	<i>P. maculata</i>	<i>P. praelongata</i>	<i>P. tuberculata</i>
Propodus P3-P4, inferior margin	smooth	smooth	smooth	smooth	several minute spines
Dactylus P3-P4, superior margin	row of small spines	row of small spines	row of small spines	smooth	row of small spines
Dactylus P3-P4, inferior margin	row of small spines	row of small spines	row of small spines	row of small spines	row of small spines
Gonopod I, angle of terminal segment	90°	no data	45°	no data	60°

TABLE I
(Continued)

	<i>P. immaculata</i>	<i>P. conculcata</i>	<i>P. echinata</i>	<i>P. polita</i>
Intersexual dimorphism between chelipeds	present	present	present	present
Cheliped dactylus, dorsal margin	serrated	serrated	finely granular	minutely granular
Cheliped carpus, articular tooth	broad, pointed	broad, pointed	low and blunt, or small tooth	low and blunt, or small tooth
Cheliped carpus, dorsal margin	granular, or several small teeth	several unequal teeth	granular, or several minute teeth	granular
Cheliped merus, medial inferior margin	granular, large distal tooth	granular, large distal tooth	granular, large distal tooth, sometimes with several unequal teeth posterior to distal tooth	smooth, small distal tooth
Cheliped merus, superior margin	granular	granular, smaller distal tooth	granular	finely granular

TABLE I
(Continued)

	<i>P. immaculata</i>	<i>P. conculcata</i>	<i>P. echinata</i>	<i>P. polita</i>
Ischium P1-P5, inferior margin	granular	sometimes minute distal spine	granular	finely granular
Merus P2-P4, subdistal tooth	small spine	pointed spine	pointed spine	no spine
Merus P2-P4, distal tooth	small spine, sometimes no spine	pointed spine	small spine, sometimes no spine	no spine
Merus P2-P4, inferior margin	minutely serrated	minutely serrated	row of spines	minutely serrated
Propodus P2, inferior margin	smooth	smooth	row of spines	several minute spines
Propodus P3-P4, inferior margin	smooth	smooth	row of spines	several minute spines
Dactylus P3-P4, superior margin	smooth, with several distal spines	smooth	smooth, with several distal spines	row of small spines
Dactylus P3-P4, inferior margin	smooth, with several distal spines	smooth, with several distal spines	smooth, with several distal spines	row of small spines
Gonopod 1, angle of terminal segment	60°	90°	90°	60°

TABLE II

Carapace proportions of the nine species of *Platyrhaphusa* recognized herein. The range of the puberty moult denotes the carapace width of the largest subadult female to the carapace width of the smallest adult female

	CH/FW	± SD	CW/FW	± SD	CL/FW	± SD	Merus	± SD	Moult of puberty	Largest known
							P5/FW		(CW mm)	specimen (CW mm)
<i>P. polita</i> Capart, 1952 (n = 8)	1.13	0.05	2.38	0.10	1.94	0.08	0.76	0.03	11.4-13.0	18.0*
<i>P. tuberculata</i> Capart, 1952 (n = 92)	1.08	0.12	2.82	0.27	2.29	0.22	1.43	0.09	17.8-18.5	39.9
<i>P. armata</i> A. Milne-Edwards, 1887 (n = 241)	1.07	0.13	2.75	0.20	2.34	0.16	1.07	0.08	35.7-38.3	60.0
<i>P. maculata</i> Cunningham, 1899 (n = 32)	1.02	0.05	2.34	0.10	2.06	0.09	0.92	0.05	11.0-12.9	17.9
<i>P. denticulata</i> Capart, 1952 (n = 19)	0.93	0.04	2.49	0.09	2.12	0.09	1.01	0.04	18.4-21.4	46.0
<i>P. praelongata</i> n. sp. (n = 1)	0.90	—	2.72	—	2.37	—	1.05	—	?	28.9
<i>P. immaculata</i> n. sp. (n = 25)	0.87	0.05	2.70	0.14	2.24	0.22	1.09	0.06	16.9-21.2	31.0
<i>P. echinata</i> Capart, 1952 (n = 45)	0.79	0.09	2.41	0.17	1.92	0.10	0.95	0.14	12.6-17.7	39.0
<i>P. conculcata</i> Cunningham, 1907 (n = 81)	0.78	0.05	2.45	0.11	2.20	0.12	1.11	0.14	11.3-17.8	30.3

* Data from Cumberlidge et al. (1999).

and II). Finally, the angle of the terminal article of gonopod 1 differs between *P. conculcata* and *P. immaculata* (table I). *Platythelphusa immaculata* is most easily distinguished from *P. echinata* by the presence of distinct spines on the inferior margin of the merus of P2-P4 of *P. echinata*, which are lacking in *P. immaculata* (table I).

***Platythelphusa praelongata* n. sp. (fig. 2A-D)**

Material examined. — Holotype, 1 adult female, gravid, CW 28.76 mm (ZMA De.204595), Lake Tanganyika, off Kazi Beach site north of Mbita Island, Zambia (08°45.22'S 31°05.14'E), 40-80 m deep, coll. local fishermen, 19 June 2002.

Diagnosis. — Carapace subhexagonal, rounded, wider than long (CW/FW 2.72; CL/FW 2.37), flat (CH/FW 0.90). Frontal margin granular, corners rounded, lacking teeth. Exorbital angle produced into broad forward-directed tooth. Epibranchial tooth small, anterolateral margin behind epibranchial tooth with several irregularly shaped small teeth and one large broad tooth lateral to mesogastric region (fig. 2A). Suborbital margin lined with large granules; broad low tooth at medial end (fig. 2C). Lateral inferior margin of merus of cheliped granular; superior margin of merus roughly granulated. Inner margin of carpus of cheliped with two large subequal carpal teeth, articular tooth (at point of articulation with propodus) broad, low; outer margin of carpus granular. Chelipeds straight, elongated, slim, with serrated dentition; slight dimorphism between left and right cheliped (fig. 2B). Merus of P5 1.5 times longer than FW. Merus of P3-P4 extremely long (2 times longer than FW); superior margin of merus of P3-P4 with low subdistal meral tooth, and low, rounded distal meral tooth. Propodus of P2-P4 long, smooth, and with thin margins. Dactyli of P3-P4 long, slim, straight, no spines on superior margin, row of small spines on inferior margin.

Description. — Carapace with fields of short carinae in lateral regions; anterolateral margin of carapace continuous with posterolateral margin. Well-defined cardiac region and cervical grooves (fig 2A). Triangular descending process of front not produced into a tooth, but with several small proximal teeth. Well-developed occlusal (sub-ocular) tooth in orbital hiatus (fig. 2D). Suborbital margin with a prominent shelf, lined with small tooth-like tubercles (fig. 2C). First antennal segment oval, fused into epistome; proximalmost antennal segment large and rectangular, with large transverse process, lying in orbital hiatus located between descending frontal tooth and occlusal tooth; distal antennal segment elongate and slim, supporting short antennal flagellum.

Endostomial ridges distinct, marking medial side of left and right anterior respiratory channels, lined with small granules; epistomial triangle conspicuous, pointing horizontally, lined with several very small granules. Mandibular palp with

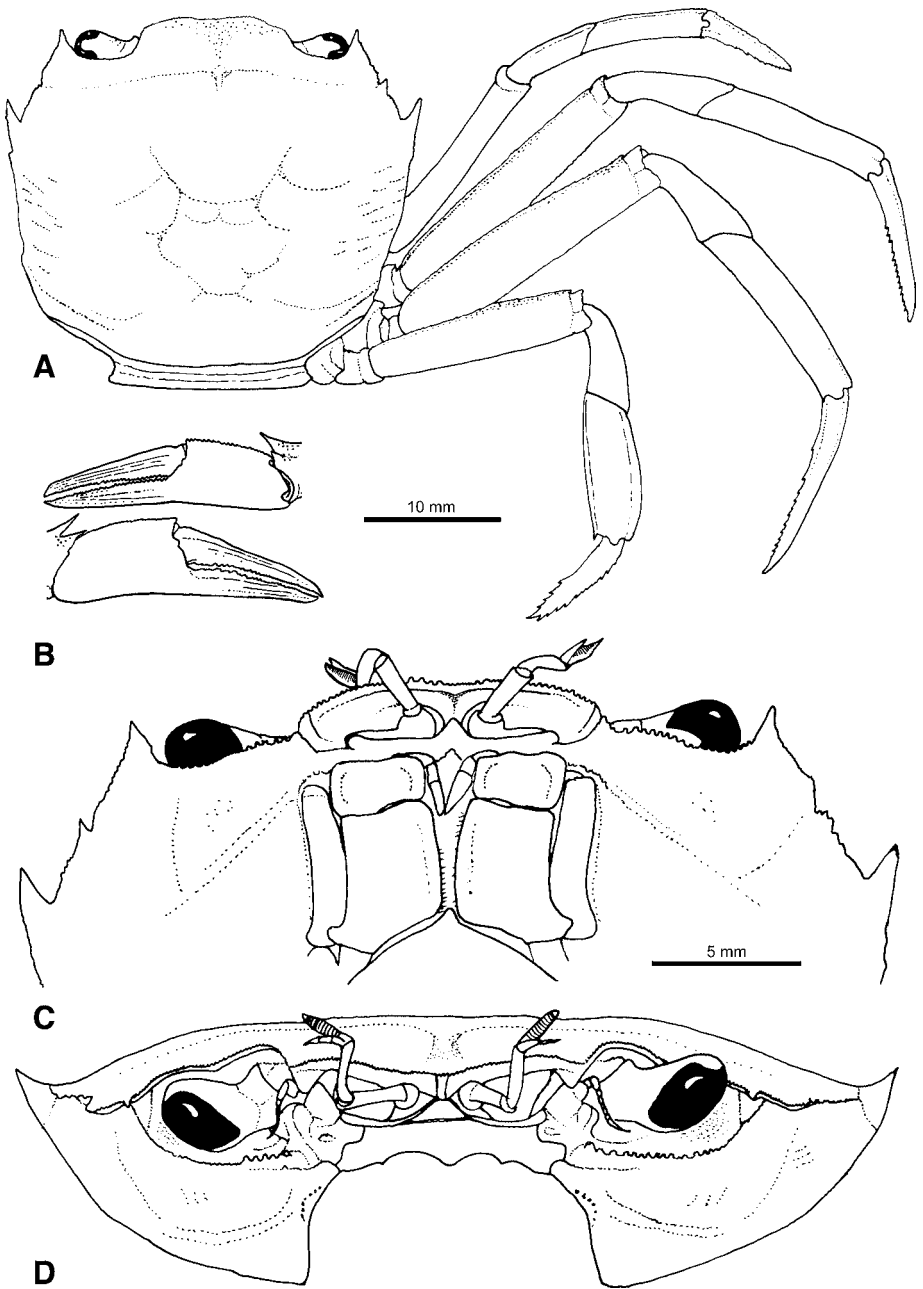


Fig. 2. *Platythelphusa praelongata* n. sp., female (gravid), CW 28.76 mm, holotype (ZMA De.204595). A, dorsal view of carapace and pereopods 2-5; B, frontal view of left (above) and right (below) cheliped; C, ventral view of anterior area of carapace showing suborbital margin and 3rd maxillipeds; D, frontal view of carapace.

three segments; proximal two segments of palp incompletely fused and sulcus between segments is still visible; terminal segment as a single large oval process positioned behind mandible. Third maxillipeds filling entire buccal frame, with transversely oval anterior respiratory openings exposed at superior lateral ends; merus with flanged edges and conspicuously widened at lateral margins; ischium of same width as merus, suture between ischium and basis marked; inferior lateral corner produced into distinct short proximal process overlapping base of exopod. Exopod of third maxilliped long ($0.66 \times$ merus length), robust ($0.33 \times$ ischium width); with distinct distal medial process and long flagellum.

Carapace with epimeral sulcus on its sidewall, vertical sulcus between epimeral sulcus and base of epibranchial tooth visible, but rather indistinct. Anterior margin of front slightly deflexed, indented slightly in the middle. Postfrontal crest distinct, granular, incomplete, not meeting anterolateral margins; short midgroove on postfrontal crest.

Outline of female pleon broad and shield shaped, telson forming broad triangle. Thoracic sternal suture s1/s2 short, complete, distinct; sternal suture s2/s3 complete, crossing entire sternum, indistinct; sternal suture s3/s4 incomplete, reduced to two small notches at sides of sternum. Episternal sutures e4/s4, e5/s5, e6/s6, and e7/s7 complete, distinct. Two of four posterior sternal sulci (s4/s5, s5/s6) widely separated medially within sterno-pleonal cavity, whereas s6/s7, s7/s8 almost continuous but not interrupted in the midline by vertical sulcus (medial line); vertical sulcus broad and interrupted in middle by diamond-shaped space. Pair of small rounded sternal condyles ("boutons pressions") within sterno-pleonal cavity on s5. Female sexual openings in sterno-pleonal cavity on s6.

Juveniles. — The pleonal brood pouch contained 32 juveniles. Carapaces almost square (CW = 3.02 ± 0.08 mm, CL = 2.83 ± 0.12 mm). Anterior margin of front granular, corners rounded, lacking teeth. Exorbital angles produced into broad forward-directed tooth. One broad tooth on anterolateral margin. Pereiopods long and slim; merus of P5 approximately 1.5 times longer than FW.

Etymology. — The specific name *praelongata* is taken from the Latin adjective 'praelongus', meaning very long, referring to the elongated pereiopods of the species. It is an adjective that agrees in gender with the feminine generic name.

Colour. — Carapace pink to grey-pink; tips of chelipeds and pereiopods white; propodus and dactylus of chelipeds red.

Distribution. — The species is known only by the holotype and associated juveniles from the vicinity of Mbita Island, Zambia, where they were collected using a gill net set at 40-80 meters depth by fishermen.

Habitat. — We have no direct observations on the habitat of *P. praelongata*. However, it was collected together with *Hemibates stenosoma* Boulenger, 1901 (Cichlidae, Bathybatini) a benthic fish species that is known to have a preference

for deep sandy or muddy substrates (Coulter, 1991). *Platythelphusa praelongata* is probably sympatric with *P. tuberculata*, since the latter species shows a strong affinity for deep, muddy habitats (Coulter, 1991; Cumberlidge et al., 1999) and is caught regularly in the nets of fishermen seeking deep-dwelling fish species in the vicinity of Mpulungu (L. Makassa, pers. comm.).

Remarks. — *Platythelphusa praelongata* bears a superficial resemblance to *P. tuberculata* because both species have elongated pereopods and a similar carapace outline. The two species can be distinguished by differences in the height of the carapace, the shape of the epibranchial lobes, the gape between the third maxillipeds, the size of the external angles of the frontal margin, and by other characters of the pereopods (tables I and II).

DISCUSSION

The platythelphusid crabs from Lake Tanganyika form a small species flock that is morphologically highly divergent from other African freshwater crab taxa. The number of valid species within the genus *Platythelphusa* and the higher taxonomy of Lake Tanganyika's endemic freshwater crabs have been a subject of debate for almost a century. For example, Cunnington (1899) recognized only two species of crabs from Lake Tanganyika, which he assigned to two different genera: *Platythelphusa armata* A. Milne-Edwards, 1887 and *Limnothelphusa maculata* Cunnington, 1899. However, his proposal to place the latter in a genus separate from *Platythelphusa* was based on the morphological description presented by A. Milne-Edwards (1887), which Cunnington (1899) acknowledged lacked sufficient information to determine the exact relationships between the two genera. In a later paper, Cunnington (1907) suppressed the genus *Limnothelphusa* and recognized three species of crabs from Lake Tanganyika in the genus *Platythelphusa* (*P. armata*, *P. maculata*, and *P. conculcata*). The genus has subsequently been assigned to various families and subfamilies, including the Potamonidae (cf. Rathbun, 1904, 1905; Alcock, 1910; Bouvier, 1917a, b, 1921; Cunnington, 1920; Capart, 1952; Bott, 1955; Balss, 1957), the Platythelphusinae (cf. Colosi, 1920), and the Potamonautidae (cf. Coulter, 1991).

The taxonomic instability of the group is most likely the result of a limited focus by each worker on a small number of morphological characters. Moreover, informative taxonomic characters such as those of the gonopods were neglected in the early accounts of African freshwater crab taxa. Cumberlidge (1999) and Cumberlidge et al. (1999) revised the genus *Platythelphusa* by focusing on characters of the gonopods, mouthparts, pereopods, and sternum, and by including morphometric data. The validity of the genus *Platythelphusa* and the establishment of the family Platythelphusidae were supported by cladistic analyses based

on morphological characters, and indicate a monophyletic origin of the platyhelphusid species flock (Cumberlidge & Von Sternberg, 1998; Cumberlidge, 1999; Von Sternberg & Cumberlidge, 1999).

Distinguishing morphological characters that set *Platythelphusa* apart from all other taxa of African freshwater crabs include (1) a terminal article of Go1 that is directed at a 45° to 90° angle to the vertical and that is smooth, short and strongly tapering to a pointed tip; (2) a three-segmented mandibular palp with a simple terminal segment; (3) a robust exopod on the third maxilliped that is 0.33 × as wide as the ischium; (4) the lack of a vertical sulcus on the ischium of the third maxilliped; (5) the presence of a prominent, shelf-like suborbital margin that is lined with tooth-like tubercles; (6) the presence of tuberculated lateral carinae on the branchial regions of the carapace; and (7) a frontal margin that is either granular or toothed (Cumberlidge, 1999; Von Sternberg & Cumberlidge, 1999).

Previous authors have expressed incongruent views about the validity of *P. maculata*, *P. conculcata*, and *P. denticulata*. Capart (1952) recognized six species of *Platythelphusa*: *P. armata*, *P. maculata*, *P. tuberculata*, *P. polita*, *P. echinata*, and *P. denticulata*, but expressed uncertainty about the validity of *P. conculcata* and considered Cunnington's (1907) type to be a junior synonym of either *P. armata* or *P. maculata*. Cumberlidge et al. (1999) recognized the validity of *P. conculcata* following comparisons of the type (NHML 1908.1.31.15) with type material of *P. armata*. Capart (1952) suggested on the basis of the relative length of P5 with respect to the front width, that the specimen of *P. conculcata* depicted by Balss (1936) is in fact *P. tuberculata*. We agree with Capart's (1952) opinion, on the basis of Balss' (1936) remarks, that the carapace of his specimen is somewhat arched, and that the pereopods have a distal meral spine, whereas the carapace of the type of *P. conculcata* is flat and the pereopods lack a distal meral spine. Bott (1955) recognized only one species of platyhelphusid (*P. armata*), which he considered to be a subgenus of *Potamonautes*, treating *P. maculata* as a junior synonym of *P. armata*, and *P. conculcata* as a subspecies of *P. armata*. Cumberlidge et al. (1999) recognized six species of *Platythelphusa*: *P. armata*, *P. maculata*, *P. tuberculata*, *P. polita*, *P. echinata*, and *P. conculcata*.

Cumberlidge et al. (1999) tentatively treated *P. denticulata* as a junior synonym of *P. conculcata* on the basis of the figure of *P. denticulata* provided by Capart (1952, fig. 2), which clearly shows characters that are characteristic of *P. conculcata*, such as a distinctive carpus of the chelipeds with a sharp and pointed articular tooth and an outer margin that is lined by a row of sharp, pointed teeth; an anterolateral margin between the exorbital and epibranchial teeth that is lined with fine teeth; and a frontal margin that is lined with fine teeth. Capart (1952) provided a brief description and illustrations of this species, based on a single adult female specimen (CW 46.0 mm) from Edith Bay, Tanzania (6°30.00'S 29°55.00'E). In his

description, Capart (1952) expressed uncertainty as to the identity of this specimen, because it bears close similarity to *P. armata*. In the present study, we examined the holotype of *P. denticulata* (IRSN I.G. 30021) and compared it with the other species of *Platythelphusa*, particularly *P. conculcata* and *P. armata*. Our comparisons revealed that *P. denticulata* differs notably from *P. conculcata* in carapace proportions, the degree of elevation of the epibranchial lobes, and the absence of sexual dimorphism in the shape and size of the chelipeds (tables I and II). Based on these characters, we here remove *P. denticulata* from synonymy with *P. conculcata*. It should be noted, however, that *P. denticulata* does bear remarkable resemblance to *P. armata*. Nevertheless, these species can be distinguished by a number of diagnostic characters, including differences in carapace proportions, the lining of the suborbital margin, the margins of the cheliped dactylus and carpus, and the distal tooth on the meri of P2-P4 (tables I and II).

KEY TO THE KNOWN SPECIES OF *PLATYTHELPHUSA*

The following key can be used to separate the currently recognized species of *Platythelphusa*:

1. Anterior margin of front deflexed or slightly deflexed, slightly indented in the middle, lacking well-defined teeth on external corners 2
 - Anterior margin of front almost horizontal, indented in the middle, with well-defined, sharp teeth on external corners 3
2. External angles of frontal margin rounded, frontal margin granular. Epibranchial tooth small, one larger tooth on anterolateral margin in mesogastric region *P. praelongata* n. sp.
 - External angles of frontal margin square shaped 4
3. Frontal margin with fine teeth 7
 - Frontal margin granular 8
4. Merus of P5 shorter than front width. One anterolateral tooth behind the epibranchial tooth, equal in size to the epibranchial tooth *P. polita* Capart, 1952
 - Merus of P5 longer than, or almost equal to, front width 5
5. Epibranchial lobes pronouncedly raised. Inferior margin of ischium of P1-P5 with distal spine *P. tuberculata* Capart, 1952
 - Epibranchial lobes low. Inferior margin of ischium of P1-P5 lacking distal spine 6
6. Inferior margins of merus and propodus of P2-P4 with row of distinct spines *P. echinata* Capart, 1952
 - Inferior margins of merus of P2-P4 granulate, inferior margin of propodus of P2 with several minute spines, P3-P4 smooth *P. maculata* Cunnington, 1899
7. Subdistal and distal tooth of merus of P2-P4 with pointed spine. Two teeth on anterolateral margin, almost equal size as epibranchial tooth *P. conculcata* Cunnington, 1907
 - Subdistal tooth of merus of P2-P4 with pointed spine, distal tooth of merus of P2-P4 without spine, or with small spine. Variable number of unequal teeth on anterolateral margin *P. denticulata* Capart, 1952
8. Subdistal and distal teeth of merus P2-P4 low, blunt, not spiny. Outer margin of cheliped carpus granular. Variable number of unequal-sized teeth on anterolateral margin *P. armata* A. Milne-Edwards, 1887
 - Subdistal tooth of merus of P2-P4 sharp spine, distal tooth of merus of P2-P4 either lacking or small. Outer margin of cheliped carpus granular or with several small teeth. Two sub-equal teeth on anterolateral margin of carapace *P. immaculata* n. sp.

ACKNOWLEDGEMENTS

The authors would like to express their gratitude to Pierre-Denis Plisnier, who collected the holotype of *P. praelongata*. We are greatly indebted to George Kazumbe, who helped to collect specimens of *P. immaculata*. We also like to thank Karel Wouters (Institut Royal des Sciences Naturelles, Brussels), for loan of the holotype of *P. denticulata*; Paul Clark and Miranda Lowe (Natural History Museum, London), Roland Melzer (Zoologische Staatssammlung, Munich), and Charles Oliver Coleman (Humboldt Museum für Naturkunde, Berlin) for loaning the type specimens of *Platythelphusa* used for the comparisons in this work; Jonathan Todd (The Natural History Museum, London) for taxonomic discussions; Lawrence Makassa (Department of Fisheries, Mpulungu, Zambia) for his assistance in Zambia; the Tanzanian Commission for Science and Technology (COSTECH) for permission to conduct research at Lake Tanganyika; the Tanzanian Fisheries Research Institute, Kigoma and acting director D. Chitamwebwa, University of Dar es Salaam, the Nyanza Project (NSF Paleoclimates ATM-9619458) and Andy Cohen for logistical assistance; Sven Lange for his support and Jan van Arkel (University of Amsterdam) for his help with the illustrations. The first author is funded by grants from the Netherlands Foundation for the Advancement of Tropical Research (WOTRO W84-489) and the Schure-Beijerinck-Popping Fund of the Royal Netherlands Academy of Arts and Sciences (SBP/JK/2003-27).

REFERENCES

- ALCOCK, A., 1910. On the classification of the Potamonidae. *Records of the Indian Museum*, **5**: 253-261.
- BALSS, H., 1936. Beiträge zur Kenntnis der Potamonidae (Süßwasserkrabben) des Kongogebietes. *Revue Zoologique et Botanique d'Afrique*, **28**: 65-204.
- —, 1957. Decapoda VIII: Systematik. In: Bronn's Klassen und Ordnungen des Tierreichs, **5** (1) (7) (12): 1505-1672. (Akademische Verlagsgesellschaft, Leipzig).
- BOTT, R., 1955. Die Süßwasserkrabben von Afrika (Crust., Decap.) und ihre Stammesgeschichte. *Annales du Musée Royal du Congo Belge, (C, Zoologie)* **1** (3) (3): 209-352.
- —, 1970. Betrachtungen über die Entwicklungsgeschichte und Verbreitung der Süßwasserkrabben nach der Sammlung des Naturhistorischen Museums in Genf/Schweiz. *Revue Suisse de Zoologie*, **77** (2): 327-344.
- BOUVIER, E. L., 1917a. Sur la classification des Eupotamonea, crabes d'eau douce de la famille des Potamonidés. *Comptes-rendus de l'Académie des Sciences, Paris*, **165**: 613-621.
- —, 1917b. Sur la classification des Parapotamonea, crabes d'eau douce de la famille des Potamonidés. *Comptes-rendus de l'Académie des Sciences, Paris*, **165**: 657-659.
- —, 1921. Voyage de Ch. Alluaud et R. Jeannel en Afrique orientale (1911-1912). Résultats scientifiques, Crustacés, Decapoda. *Librairie des Sciences Naturelles*, **3**: 23-62. (L. Lhomme, Paris).

- CAPART, A., 1952. Exploration hydrobiologique du Lac Tanganyika (1946-1947), Resultats scientifiques — Crustacés Décapodes Brachyures. Institut Royal des Sciences Naturelles de Belgique, **3** (3): 41-67.
- —, 1954. Révision des types des espèces de Potamonidae de l'Afrique tropicale conservés au Muséum d'Histoire naturelle de Paris. Volume jubilaire de Victor van Straelen, Directeur de l'Institut Royal des Sciences Naturelles de Belgique, 1925-1934, **2**: 819-847.
- COLOSI, G., 1920. I Potamonidi conservati del R. Museo Zoologico di Torino. Bolletino dei Musei di Zoologia ed Anatomia comparata della R. Università di Torino, **35** (734): 1-39.
- COULTER, G. W., 1991. Lake Tanganyika and its life: 1-354. (Oxford University Press, Oxford).
- CUMBERLIDGE, N., 1998. The African and Madagascan freshwater crabs in the Zoologische Staatssammlung, Munich. Spixiana, **21** (3): 193-214.
- —, 1999. The freshwater crabs of West Africa, family Potamonautidae. Faune et Flora Tropicale, **35**: 1-382. (Institut de Recherche pour le Développement Collection Faune et Flore Tropicales, Paris).
- CUMBERLIDGE, N. & R. VON STERNBERG, 1998. Phylogenetic relationships of the freshwater crabs of Lake Tanganyika (Decapoda, Brachyura). In: F. R. SCHRAM & J. C. VON VAUPEL KLEIN (eds.), Crustaceans and the biodiversity crisis. Proceedings of the 4th International Crustacean Congress, **1**: 405-422.
- CUMBERLIDGE, N., R. VON STERNBERG, I. R. BILLS & H. MARTIN, 1999. A revision of the genus *Platythelphusa* A. Milne-Edwards, 1887 from Lake Tanganyika, East Africa (Decapoda: Potamoidea: Platythelphusidae). Journal of Natural History, London, **33**: 1487-1512.
- CUNNINGTON, W. A., 1899. On a new brachyurous crustacean from Lake Tanganyika. Proceedings of the Royal Society of London, **1899**: 697-704.
- —, 1907. Zoological results of the third Tanganyika expedition, conducted by Dr. W. A. Cunnington, 1904-1905. Report on the brachyurous Crustacea. Proceedings of the Royal Society of London, **2**: 258-276.
- —, 1920. The fauna of the African Lakes: a study in comparative limnology with special reference to Lake Tanganyika. Proceedings of the Zoological Society, London, **3**: 507-622.
- GUINOT, D. & J. M. BOUCHARD, 1998. Evolution of the abdominal holding systems of brachyuran crabs (Crustacea, Decapoda, Brachyura). Zoosystema, **20** (4): 613-694.
- MILNE-EDWARDS, A., 1887. Observations sur les crabes des eaux douces de l'Afrique. Annales des Sciences Naturelles, Paris, **7** (4): 161-191.
- RATHBUN, M. J., 1904. Les crabes d'eau douce (Potamonidae). Nouvelles Archives du Muséum d'Histoire naturelle, Paris, **6** (4): 255-312.
- —, 1905. Les crabes d'eau douce (Potamonidae). Nouvelles Archives du Muséum d'Histoire naturelle, Paris, **7** (4): 159-322.
- —, 1933. Reports on the scientific results of an expedition to the southwestern highlands of Tanganyika territory. No. 5, Crabs. Bulletin of the Museum of Comparative Zoology at Harvard College, **75**: 251-260.
- STERNBERG, R. VON & N. CUMBERLIDGE, 1999. A cladistic analysis of *Platythelphusa* A. Milne-Edwards, 1887, from Lake Tanganyika, East Africa (Decapoda: Potamoidea: Platythelphusidae) with comments on the phylogenetic position of the group. Journal of Natural History, London, **33**: 493-511.